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(54) **Dropper bottle for two products to be mixed prior to use.**

(57) A bottle (1) designed to contain two substances to be mixed immediately prior to use so as to obtain a medicine or cosmetic, the first contained in a reservoir (7) having a diaphragm bottom (8) that shears as a result of down-thrust applied to the top of a cap (16) consisting of a tear-off warranty seal (20) advantageously interposed, for tearing off, between the lower extremity of the cap itself and a lower annular element (26) anchored to the lower part of said reservoir; it being envisaged that the mixing of the two substances and the removal of the cap cannot take place without the warranty seal being torn off. For use in the fields of pharmaceuticals and cosmetics.

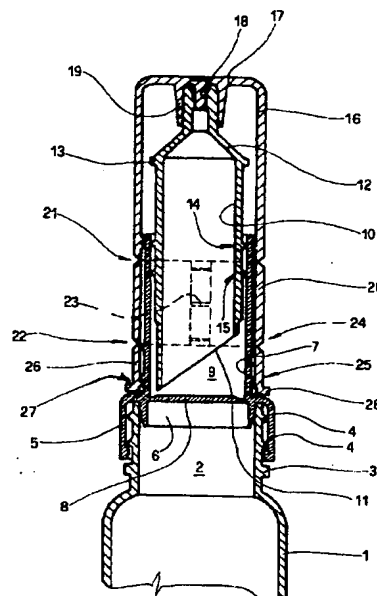


FIG. 1

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The invention concerns a dropping bottle particularly for pharmaceutical products which, prior to use, are activated by being mixed together, namely, a deformable plastic container, generally containing a liquid substance, into which another, generally powdery, substance contained in a reservoir above is precipitated, following the partial thrust-shearing of the diaphragm forming the bottom of said reservoir by the lower cutting end of the dropper sliding inside the reservoir itself: the top end of said dropper being covered by a cap which also serves to apply down-thrust to the dropper; the liquid substance and the powdery one, or also two liquid substances, being of a medicinal or cosmetic nature.

The prior art comprises flexible bottles with a cylindrical reservoir open at the top, its lower extremity being anchored internally and externally to the neck of the bottle and its base consisting of a diaphragm shearing peripherally on thrust being applied to a rigid dropper having a chisel-shaped lower cutting-end and a top dispensing-end featuring a calibrated aperture and fitted with a cap that closes, protects and actuates and which forms a close, sliding fit on the outer cylindrical surface of said reservoir when actuated by pressure being applied to the top of said cap in order to shear said diaphragm and so cause the two substances to mix.

However, such a cap does not make apparent any modifications that may have been made to the substances contained in the reservoir, in that said reservoir is accessible from above, for example, with a syringe, merely by removing the cap which adheres to the outside of the reservoir itself by friction alone or is anchored in a slight undercut that can easily be overcome by a backwards pulling action exerted by the fingers. Said prior art is susceptible of considerable improvement with a view to eliminating this drawback.

From the foregoing emerges the need to resolve the technical problem of inventing a safety-bottle that does not allow the two substances to be mixed, following the shearing of the diaphragm by the dropper on pressure being applied to the cap, without prior elimination of a warranty element, removal of which will constitute evidence of tampering.

The invention resolves said technical problem by adopting a bottle surmounted by a reservoir having a base in the form of a diaphragm shearing as a result of down-thrust applied to the cap enclosing the top of the dropper, said dropper having a chisel-shaped lower cutting end, the casing of said cap extending towards the neck of the bottle in at least one continuous or sectional warranty seal, delimited by shear lines, as required, said casing having, at its lower extremity, a lip protruding inwards and lodging in a corresponding groove cut into the reservoir or into an external downwards extension of the same: the whole of the casing and the warranty seal being substantially con-

tinuous at least as far as the step at the top of the union square to the neck of the bottle; the presence of said seal preventing both the activation of mixing, in the case of down-thrust being applied to the cap, and the removal of said cap, given the impossibility of the cap's sliding axially when the warranty seal has not been torn off.

The advantages of the invention are: the impossibility of perforating the diaphragm without removing the warranty seal; the impossibility of sliding the cap off without removing the warranty seal and hence the impossibility of gaining access to the substance contained in the reservoir without leaving evidence of tampering, namely, the absence of the warranty seal and the presence of any separable lower remains of it.

Some embodiments of the invention are illustrated, by way of example, in the four tables of drawing attached, in which: Figure 1 is the enlarged axial section of the top part of the bottle, fitted with a mixing device with tamper-proof seal, in the embodiment wherein the lower end of the cap comprises a warranty seal with below it a separable annular element and with a union to the neck integral with the reservoir: the whole as it appears before use; Figure 2 is a section as in Figure 1, but in the mixing phase prior to use; Figure 3 is a part-sectional view of the whole of the element that actuates, protects and offers warranty and also serves as a plug; Figure 4 is the cross-section IV-IV of Figure 3; Figure 5 is a partial section of the rigid body of the dropper for dispensing measured drops having a funnel at the top and a perforator at the bottom; Figure 6 is a partial section of the reservoir containing the substance to be fed into the body of the bottle below and mounted on the neck of said bottle; Figure 7 is a partial section of the body, incomplete, of the bottle generally containing liquid; Figure 8 is a section as in Figure 1, but restricted to the upper middle part, in an embodiment of the bottle that has the lower annular section of the multi-function hollow cylindrical element integral with the union to the neck of the bottle; Figure 9 is an analogous section of another embodiment, in which said union is independent both of said hollow cylindrical element and of the body of the reservoir; Figure 10 is an analogous section of another embodiment, wherein the lower part of the cap has a warranty seal of which the lower separable ring extends and broadens into a sort of cap enclosing the union, integral with the reservoir, mounted on the neck; Figure 11 is an analogous section of another embodiment, simplified with respect to that of Figure 1, wherein the warranty seal is without a separable lower annular section.

It is to be noted that the embodiment of Figure 11 can be combined with that of Figure 9, wherein the neck union is independent of the reservoir.

The figures show: the body of the bottle 1, having a neck 2, for example with a lower locating ring 3 act-

ing as an assembly bearing; one or more annular projections or threads 4 connecting with a union 5 having a watertight inner lip 6 of the hollow cylindrical body 7 of the dispenser of the substance, be it liquid, powder or solid, to be mixed with the liquid in the bottle below; a diaphragm 8 with a predetermined peripheral shear-line, supporting the substance contained in the chamber 9 of the reservoir 7; a hollow, cylindrical intermediate body 10 of the dropper, a bottom end being chisel-shaped so as to shear the diaphragm 8; an upper funnel 12 of the body 10, acting as a dropper; a ring 13 forming the outside edge of the funnel 12 to arrest the downstroke of the dropper once shearing is complete; an upper outer ring 14 and a lower ring 15 respectively of the hollow cylindrical body 10 of the dropper forming a watertight seal; a multi-function hollow cylindrical element 16, in the form of a cap, with a top end 17 incorporating a stopper 18 for the dropper funnel 12 and a watertight bushing 19; a warranty-seal 20 being an extension downwards of said cap 16 and separable from it by tearing along the circumferences 21, 22, designed to shear after removal of the tabs 23 straddling the vertical line between the edges of said seal; two sectorial annular portions 24 of the hollow cylindrical body 7 of the reservoir, acting as an air-vent where necessary, as in the case of freeze-drying; a lower outer ring 25 of the hollow cylindrical body 7 of the reservoir to anchor, on assembly, a separable lower annular section 26 of the cap 16 to the body 7 of said reservoir by means of a lower inner ring 27 of the lower annular section 2b destined, initially, to prevent the cap 16, or multi-function element 16, 20, 26, from sliding off, being anchored under said outer ring 25; an outer base-ring 28 of the element 26 to suspend it during advancement on assembly; a lower annular section 29 (Figure 8) of the multi-function hollow cylindrical element 16, integral with the union to the neck 2 of the bottle 1; a hollow cylindrical body 30 of the reservoir without the union 5; a flat lower ring 30a of the reservoir 30 lodging in a step in the rim of the neck 2; a sleeve coupling 31 (Figure 9) securing the hollow cylindrical body 7 of the reservoir to the neck 2 of the bottle 1 rendered independent of said body; a lower section 32 (Figure 10) of the hollow cylindrical element 16, below the warranty seal 20, in the shape of a separable ring extending downwards to form a cap; a lower inner ring 32a of the cap 32 anchored in undercut under the union 5 of the reservoir; a lower part 33 (Figure 11) of the hollow cylindrical device 16, acting as a warranty-seal and anchoring ring.

It is to be noted that, in two of the embodiments, the separable lower annular section below the warranty seal is anchored to the body 7 of the reservoir (Figures 1, 9); in the embodiment of Figure 8, the separable annular section of the warranty seal is anchored to the neck of the bottle 1; in the embodiment of Figure 10, said separable annular section is anchored

under the bottom lip of the union 5 of the body 7 of the reservoir to the neck 2; in the embodiment of Figure 11, with said lower annular section missing, the warranty seal 33 is anchored to the body 7 of the reservoir.

In practice, the materials, dimensions, the shape of the bottle and the details of execution can differ from those indicated, while being technically equivalent, without thereby departing from the juridical domain of the present invention.

Claims

1. A dropping bottle particularly for pharmaceutical products to be activated by mixing prior to use, comprising a deformable bottle body (1) having a neck (2) onto which is mounted a union (5) with a reservoir (7), containing the substance to be mixed supported on a diaphragm (8) which can be partly thrust-sheared by means of a rigid dropper (10) having a chisel-shaped bottom end (11), the top end of said dropper marrying with a cap (16) which seals, protects and actuates, characterized in that, the internal surface of said cap sliding vertically on the outer surface of said reservoir, at least an annular element is interposed between the bottom end of said cap and the rim of the neck (2) to form a tear-off warranty seal detaching from said cap along a circumference (21), designed to shear as required: said annular element being anchored at the bottom, so preventing any push-pull axial movement of said cap.
2. A dropping bottle, as claimed in Claim 1, characterized in that said warranty seal consists of a tear-off ring (20) delimited top and bottom by two circumferences (21, 22) designed to shear as required the lower circumference (22) separating said warranty seal from a lower ring (26), having an internal ring (27) lodging securely under a lower ring (25) forming a rib on the outer surface of the reservoir (7) in turn anchored to the neck (2) of the bottle (1).
3. A dropping bottle, as claimed in Claim 2, characterized in that, the cap (16) having a lower tear-off warranty seal (20) surmounting a separable annular element anchored to the reservoir (7), said reservoir has a lower ring (30a) for insertion into the rim of the neck (2); it being envisaged that said annular element (29), being separable from the warranty seal (20) above it, is integral with the union (30b) below it anchored to the neck itself: the latter having a plane surface with a step to keep said lower ring inserted in said rim.

4. A dropping bottle, as claimed in Claim 3, characterized in that, the cap (16) having a lower tear-off warranty seal (20) surmounting a separable annular element (26), anchored at the base to the reservoir (7), said reservoir is kept in firm contact with the neck (2) by compression of the lower ring (30a) in the relative inner groove of said neck by means of the flat square-cut upper lip of the union (31) rendered independent of said reservoir and anchored to the outside of said neck. 5
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5. A dropping bottle, as claimed in claim 2, characterized in that, the cap (16) having a tear-off warranty seal (20) surmounting a separable lower ring, said ring is integral with the union (32) below it encasing the union (5) of the reservoir (7): it being envisaged that the lower inner lip (32a) of the union (5) of said separable ring be anchored in undercut under said union of the reservoir. 15
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6. A dropping bottle, as claimed in claim 1, characterized in that, the bottom end of the cap (16) having a separable rim (33) with a lower inner annular projection (27) lodging under the lower outer annular projection (25) of the reservoir (7), said ring constitutes a warranty seal. 25

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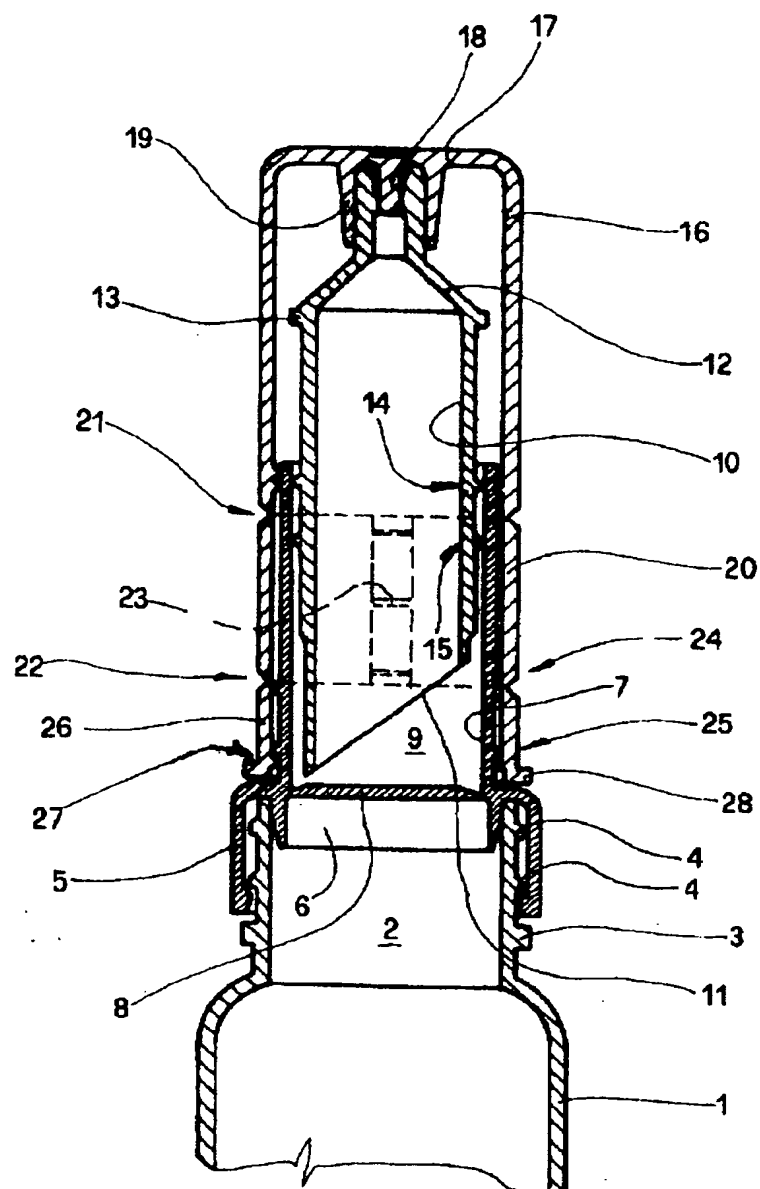


FIG. 1

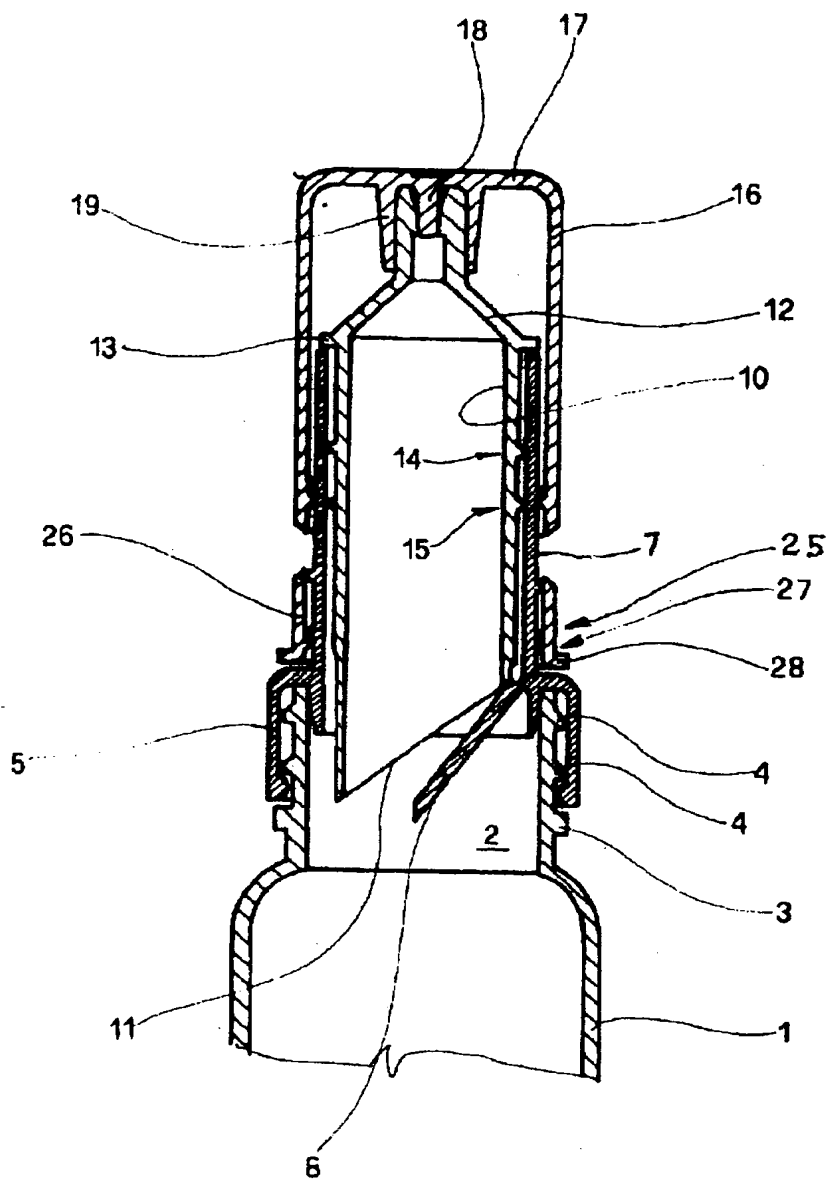
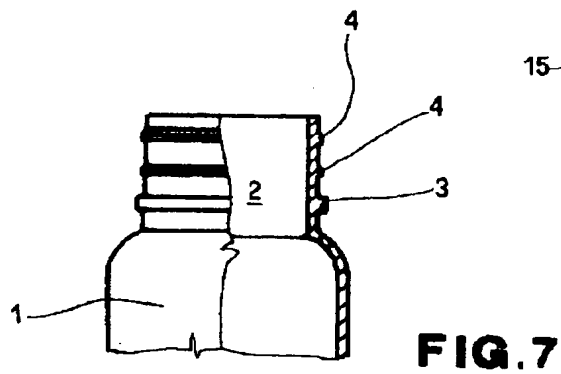
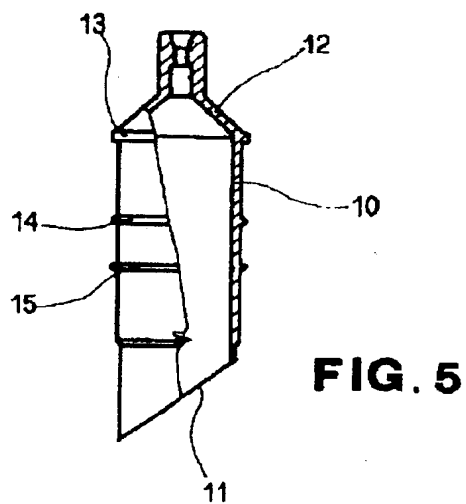
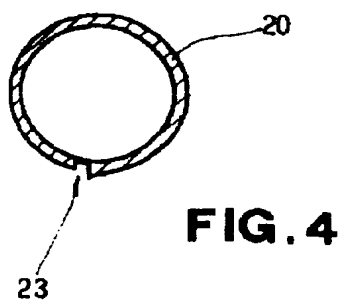
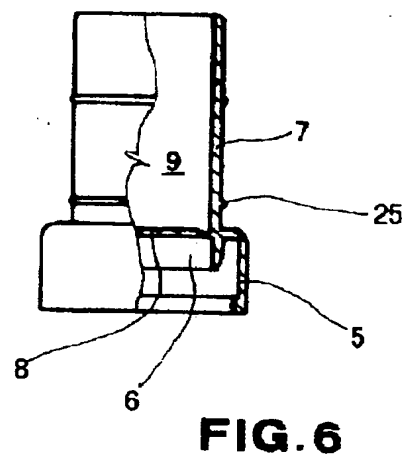
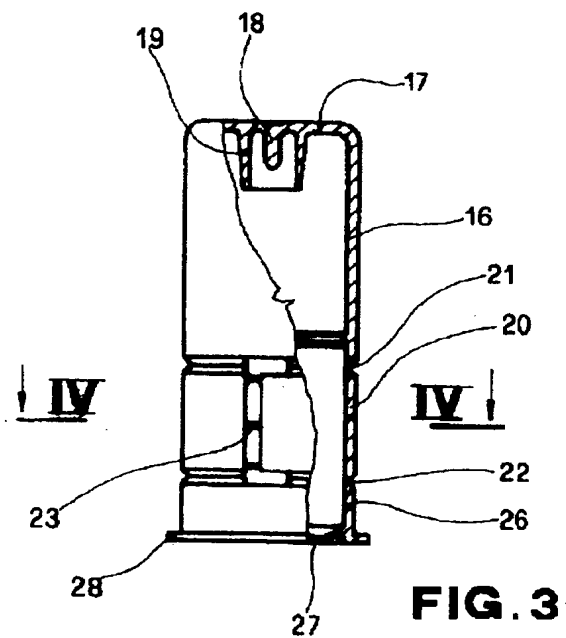


FIG. 2

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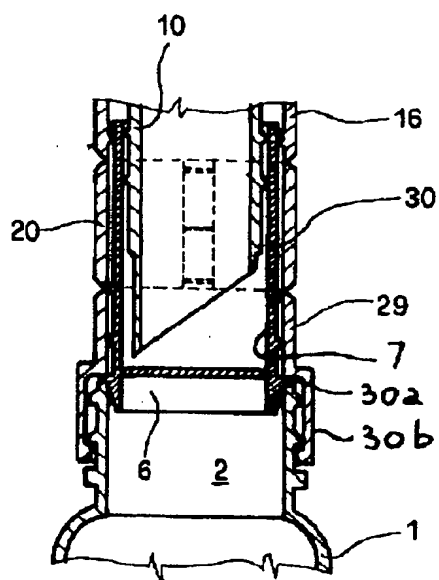


FIG. 8

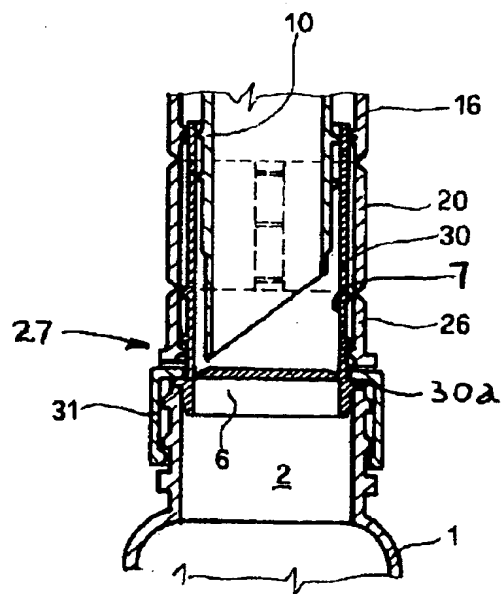


FIG. 9

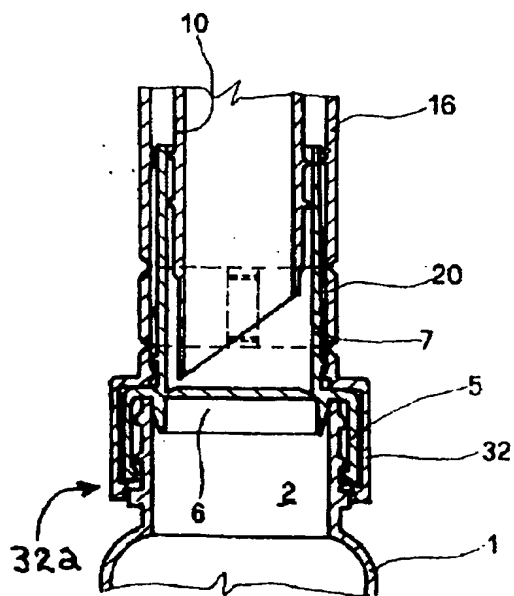


FIG. 10

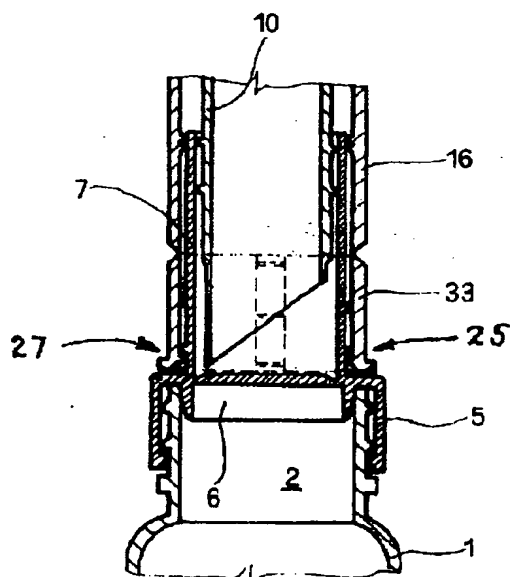


FIG. 11



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EUROPEAN SEARCH REPORT

Application Number

EP 93 10 4161

| DOCUMENTS CONSIDERED TO BE RELEVANT | | | |
|--|---|--|---|
| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int. Cl.5) |
| Y | EP-A-0 217 425 (ZAMBON) * figure 1 * | 1-2,6 | B65D51/28 |
| Y | EP-A-0 344 849 (DAM TECHNOLOGICAL RESEARCH) * column 2, line 45 - column 3, line 39 * * column 3, line 50 - column 4, line 5; figures * | 1-2,6 | |
| A | EP-A-0 093 090 (CAPSULIT) * figure 2 * | 1,3 | |
| A | US-A-3 802 604 (MORANE ET AL.) * column 4, line 8 - line 18; figures 1,2 * | 1 | |
| | | | TECHNICAL FIELDS SEARCHED (Int. Cl.5) |
| | | | B65D |
| The present search report has been drawn up for all claims | | | |
| Place of search THE HAGUE | | Date of completion of the search 14 JUNE 1993 | Examiner Alain BRIDAULT |
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